

CLAIMS:

Sub A1

1. A intrinsically gel-free, randomly branched polyamide comprising at least units derived from:

1. AB monomers, which monomers have both a carboxylic group (A) and an amine group (B),
2. at least one compound I, being a carboxylic acid (A_v) having a functionality $v \geq 2$ or an amine (B_w) having a functionality $w \leq 2$,
3. at least one compound II, being a carboxylic acid (A_v) having a functionality $v \geq 3$ or an amine (B_w) having a functionality $w \geq 3$, compound II being a carboxylic acid if compound I is an amine or compound II being an amine if compound I is carboxylic acid if compound I is an amine or compound II being an amine if compound I is a carboxylic acid, characterized in that the amounts of units derived from all carboxylic acids and amines in the polyamide satisfy formula a

Sub A2

$$P < 1 / [(F_A - 1) (F_B - 1)] \quad (1)$$

where

$$P = [\sum (n_i f_i)]_x / [\sum (n_i f_i)]_Y \quad (2)$$

where $P \leq 1$ and either $X = A$ and $Y = B$, or $X = B$ and $Y = A$, and

$$F_x = \sum (n_i f_i^2) / \sum (n_i f_i) \quad (3)$$

for, respectively, all carboxylic acids ($X = A$) and all amines ($X = B$),

where f_i is the functionality of either the carboxylic acid ($f_i = v_i$) or

amine ($f_i = w_i$), n_i being the number of moles of the carboxylic acid or amine and the summation involving all units derived from carboxylic acids and amines in the polyamide except:

carboxylic acids (A_v) having a functionality v and amines (B_w) having a functionality w , in the following amounts (in $\mu\text{mol/g}$ of polyamide):

- B_1 (20), B_3 (60) and A_2 (20)
- B_1 (10), B_3 (60) and A_2 (30)
- B_1 (120), B_2 (30) and A_3 (60)
- B_1 (150), B_2 (30) and A_3 (70)
- B_1 (170), B_3 (30), A_2 (60) and A_3 (60).

2. The polyamide according to claim 1, the functionality of compound wherein I can be chosen from 2, 3, 4, 5 and 6 and the functionality of compound II can be chosen from 3, 4, 5 and 6.
3. The polyamide according to claim 1, the functionality of wherein compound I is 2 and the functionality of compound II is 3.
4. The polyamide according to claim 3, wherein at least a unit derived from monofunctional carboxylic acid or amine is present.
5. The polyamide according to claim 3, wherein compound I is chosen from the group formed by terephthalic acid and 1, 6-hexa-methylene diamine.
6. The polyamide according to claim 3, wherein compound II is chosen from the group formed by 1, 3, 5-tris (caproic acid) – melamine, trimesic acid and bis (hexamethylene triamine).
7. The polyamide according to claim 1 wherein the AB monomer is an α , ω – amino acid and/or a lactam.
8. The polyamide according to claim 7, wherein the lactam is ζ -caprolactam.

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Sub AB

Sub AM

Sub A4

9. A process for the preparation of a polyamide film, wherein a polyamide according to claim 1 is chosen as polyamide.

10. A fiber, film, foam or molded article obtained from polyamide according to claim 1.

11. A flat film obtained from a polyamide according to claim 1.

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